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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,107	03/08/2005	Catherine Lamy	FR 020095	9544

24737 7590 04/20/2006

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER	
RIZK, SAMIR WADIE	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/527,107	LAMY, CATHERINE	
	Examiner	Art Unit	
	Sam Rizk	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-12* is/are rejected.

7)☒ Claim(s) *7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/8/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTIONS

- Claims 1-12 have been submitted for examination
- Claims 1-6,8-12 have been rejected
- Claim 7 is objected to.

Claim Objections

1. Claims 8 and 9 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Accordingly, the claims 8 and 9 are not been further treated on the merits.

2. Claim 1 in page 14, line 6 should read:

   "..estimation of ~~an~~ **a** hard-output.."

   appropriate correction is required.

3. Claim 2 is objected to because reference character "**155**" has not been shown in the drawings. The Examiner assumes that applicant intended to use reference character "**115**".

   appropriate correction is required.

Drawings Objections

4. Figures 1,2 and 5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Sivasankaran et al. Twin-Stack Decoding of Recursive Systematic Convolutional Codes, IEEE transactions on communications, vol. 49, no. 7, July 2001 (Hereinafter Sivasankaran).

6. In regard to claim 1, Sivasankaran teaches:

- A method for source decoding a variable-length soft-input codewords sequence (y [1:T]) into a soft-output bit sequence (Av [1: T]), the variable-length soft-input input codewords sequence (y [1: T]) encoded in accordance with a VLC codewords table, characterized in that it comprises:

A. a first stage (100) of implementing a stack decoding algorithm for a sequential estimation of an hard-output bit sequence of said variable length soft-input codewords sequence, including storage of intermediate data contained in the stack and generated by the stack decoding algorithm ; and

(Note: Section III Twin Stack Decoding of RSC codes, page 1159 and Fig. 1, page 1160 and Fig. 7, page 1165 in Sivasankaran)

B. a second subsequent stage (102) of post-processing the stored intermediate data for generating the soft-output bit sequence (Av [1: T]), a soft-output (A(x [t)])) being provided for each bit.

(Note: Section III Twin Stack Decoding of RSC codes, page 1159 and Fig. 1, page 1160 and Fig. 7, page 1165 in Sivasankaran)

The Examiner notes that the SI/SO decoders in Fig. 7 in Sivasankaran are General Viterbi Decoders (GVD) that includes VLC decoders as cited in the instant application.

7. In regard to claim 2, Sivasankaran teaches;

- Method according to claim 1, characterized in that the first stage (100) of implementing the stack decoding algorithm comprises the steps of:
- creating (111) an unitary tree associated with said VLC codewords table, said unitary tree comprising nodes linked by branches, a path being defined by the branches from the initial node to each node of the tree;
- implementing the following sub-steps from an initial node of the unitary tree by using a stack of paths, the stack having a current top path, each path being associated with a cumulative metric, the implementation being carried out until a set of stop conditions is verified:

(Note: Section (A) Sequential Decoding: The Stack Algorithm, Page 1159 in Sivasankaran)

*Computing (113) a metric M for each branch succeeding the current node of a current top path;

*If (114) the last node of the current top path corresponds to a codeword, concatenate (155) the unitary tee with the current tee by placing the initial node of the unitary tree at least at the last node of the current top path;

* Deleting (1 16) the current top path from the stack;

* Inserting (1 17), in the stack, new extended paths made of the current top

path and the succeeding branches, the cumulative metric of the new extended path being computed for each extended paths as the metric of current top path increased by the metric of the associated succeeding branch; and

* Selecting (118) a new current top path according to the cumulative metrics associated to the paths.

(Note: Fig. 1 flow chart of the Twin stack decoder in Sivasankaran)

8. In regard to claim 3, Sivasankaran teaches:

- Method according to claim 2, characterized in that the metric associated to a branch leading to a node l at time t is defined as follows:

m(1, y(t)) = - log P(y(t) I v(1)) - logpt(l) + log Pc(y(t))

* where Np : the set of nodes having a predecessor ;

* pt(l) (1 Np): the a priori probability of the branch reaching the node 1 at time t;

* v(l) (1 e Np): the value of the branch reaching the node 1, v(1) s (0,1);

* P0(y (t)) : a Fano - Massey metric which allows to compare fairly sequences of different lengths.

(Note: Page 1163, lines (13-40) in Sivasankaran)

9. In regard to claim 4, Sivasankaran teaches:

- A method according to claim 2 or 3, characterized in that the new current top path selected is the path having the smallest cumulative metric among the paths inserted in the stack.

(Note: Page 1163, lines (13-40) in Sivasankaran)

(Note: Fig. 1 flow chart of the Twin stack decoder in Sivasankaran)

10. In regard to claim 5, Sivasankaran teaches:

- A method according to any one of claims 2-4, characterized in that said set of stop conditions comprises the fact that the current top path contains the number of bits and the number of codewords of the variable-length soft-input codewords sequence (y (1: T)).

(Note: Fig. 1 stop condition decision "Is Top node of stack_0 or Stack_1 is leaf?" in Sivasankaran)

11. In regard to claim 6, Sivasankaran teaches:

- A method according to any one of the preceding claims 2-5, characterized in that the second subsequent stage (102) of post-processing the stored intermediate data comprises the step of approximating each soft-output A(x [t]) for each bit by:
- $A(X(t)) = u(t,0) - u(t,1)$

where u(t,1) is the minimum cumulative metric for all the path in the stack for which the t estimated bit is 1 and p(t, 0) is the minimum cumulative metric for all the paths in the stack for which the t estimated bit is 0.

(Note; Fig. 1 "State_1" and State_0" path in Sivasankaran)

12. In regard to claim 10, Sivasankaran teaches:

- A decoder for source decoding a variable-length soft-input codewords sequence (y (1: T2) into a soft-output bit sequence (Av (1: T)),
- the variable-length soft-input input codewords sequence (y (1: T)) encoded in accordance with a VLC codewords table, characterized in that it comprises
- means for implementing a stack decoding algorithm for a sequential estimation of an hard-output bit sequence of said variable length soft-input input codewords sequence, including storage means for storing intermediate data contained in the stack and generated by the stack decoding algorithm ; and
- means for post-processing the stored intermediate data for generating the soft-output bit sequence (Av (1: T)), a soft-output (A(x (t))) being provided for each bit.

(Note: Section (A) Sequential Decoding: The Stack Algorithm, Page 1159 in Sivasankaran)

(Note: Fig. 1 flow chart of the Twin stack decoder in Sivasankaran)

Allowable Subject Matter

13. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

The prior art of record and, in particular, Sivasankaran teaches all the limitations in claims 2-5

However, the prior art do not teach, suggest, or otherwise render obvious:

- A method according to any one of the preceding claims 2-5, characterized in lat the second subsequent stage (102) of post-processing the stored intermediate data comprises the step of approximating each soft-output A(x [t]) for each bit by:
- $A(x[t]) = \log \left(\sum_{1<i<r,\ Tpi>=t,\ \hat{x}\,pi[t]=1} e^{-upi} / \sum_{1<i<r,\ Tpi>=t,\ \hat{x}\,pi[t]=o} e^{-uPi} \right)$

Where Pi (i ∈1,...r)) are the r examined paths stored in the stack and pi is the cumulative metric of path Pi, Tpi is the length of path Pi and kpi (t) is the ttb hard bit of an hard bit sequence corresponding to path Pi.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Ran et al. US publication no. 2001/0007578 teaches method and system for encoding data for transmission channels.
- Yamasaki et al. US patent 4797887 teaches sequential decoding method and apparatus.
- Lamy et al. US publication no. 2004/0259098 teaches method of decoding a variable-length codeword sequence.
- Hagenauer et al US patent 6851083 teaches method for transmitting source encoded digital signals.
- Lamy et al. US patent no. 6891484 teaches method of decoding a variable length codeword sequence
- Bakhmutsky US patent 6246347 teaches controller for a variable length decoder.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Rizk whose telephone number is (571) 272-8191. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronics Business Center (EBC) at 866-217-9197 (toll-free)

Sam Rizk, MSEE, ABD

Examiner

ART UNIT 2133

4/17/06

GUY LAMARRE
PRIMARY EXAMINER